Gender and Attitudes toward Protected Areas in Myanmar

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From grassroots conservation projects to international committees on the environment, women's representation is an important component of a fair, inclusive, and effective conservation process. In this article, we focus on gender differences in local residents' attitudes toward protected areas in Myanmar. We found women are less likely to have a positive attitude toward the protected areas and are less likely to express perceptions of problems and benefits associated with the areas than men. Using decomposition analysis, we find that the majority of the difference between men's and women's attitudes is explained by these differences in perceptions. Further, much of the difference is explained by men being more likely to perceive conservation and ecosystem service benefits than women, which is the most influential determinant of attitude.

Keywords attitudes, gender, Myanmar, park–people relationships, perceptions, protected areas

From grassroots conservation projects to international committees on the environment, women are often underrepresented in the conservation process (Deda and Rubian 2004; Sodhi et al. 2010). Women's participation is often limited to awareness-raising activities and labor contribution projects (Arya 2007). In their review of implementation of the Convention on Biological Diversity, Deda and Rubian (2004) conclude that greater efforts must be made to address the gender disparity in biodiversity conservation policy and actions.

Positive relationships between local residents and protected areas are critical to the long-term successful conservation of protected areas. Ensuring that women's perspectives are included in our understanding of those relationships is not only an important component of a fair and inclusive conservation process, but also has positive practical implications for conservation of protected areas. On one hand, this is because protected areas can disproportionately impact women. For example, women have been shown to bear a greater share of the psychological and physical costs of wildlife conflicts in India (Ogra 2008). If these differences are not recognized, women may receive fewer direct benefits from conservation and be left bearing more costs (Hunter et al. 1990).

On the other hand, women can make significant contributions to conservation. Westermann et al. (2005) found in natural resource management groups in 20 countries of Latin America, Africa, and Asia, that collaboration, solidarity, and conflict resolution were greater in groups where women were present. In Nepal and India, Agarwal (2009) found that greater women's participation in forestry groups was correlated with better forest condition, in terms of both conservation and regeneration, and increased forest patrolling and rule compliance.

Unfortunately, our understanding of gender in the context of people's attitudes toward protected areas (PAs) is limited. Many studies limit their sample to household heads, who are most often men (e.g., Tessema et al. 2010; Vodouhê et al. 2010), or do not break down results by gender (e.g., Silori 2007; Rinzin et al. 2009). Studies that include gender as one of many socioeconomic characteristics that may influence people's relationships with PAs, along with others such as education and wealth, have had mixed results. Some studies find that men have more positive attitudes toward specific protected areas (Mehta and Heinen 2001; Xu et al. 2006; King and Peralvo 2010), some find women more positive (Arjunan et al. 2006), and some find no difference (Bauer 2003; Carrus et al. 2005; Wang et al. 2006; Baral and Heinen 2007; Ferreira and Freire 2009).

As described earlier, studies examine the role of gender in conservation without attention to attitudes toward protected areas or they explore the determinants of attitudes toward protected areas without a focus on gender. To our knowledge, however, there are no studies that focus on the effect of gender on attitudes toward protected areas. Thus, this article contributes to the literature by directly examining gender differences in local residents' perceptions of protected areas in Myanmar. We explore whether men and women differ in their attitudes toward the protected areas and perceptions of protected area benefits and problems. Then we explore whether gendered differences in perceptions and socioeconomic characteristics account for any difference in women's and men's attitude toward the protected areas.

Methods

Study Areas

Myanmar is one of the most biologically diverse regions in Asia (Myers et al. 2000) and has maintained large areas of natural habitats compared to other Southeast Asian countries, as well as being a stronghold for large mammals, such as tigers and elephants (Leimgruber et al. 2003). However, its natural resources and protected areas are under increasing pressure from its own human population, as well as from demands from its neighbors, such as China, Thailand, and India (Aung et al. 2004).

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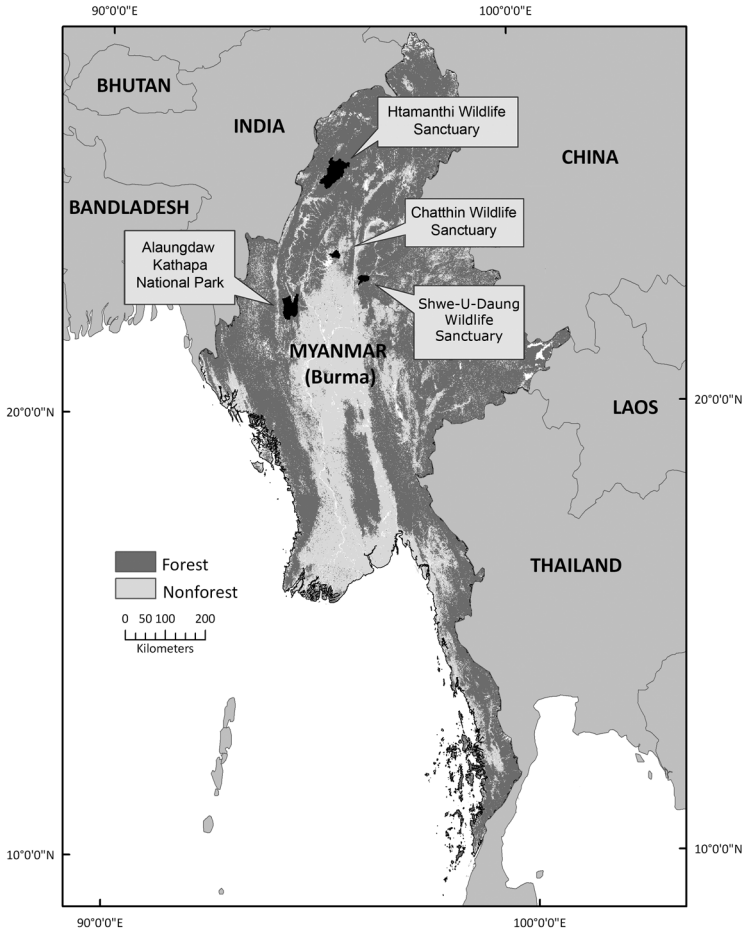
Figure 1. Location of study areas.

This study was conducted around four protected areas: Alaungdaw Kathapa National Park (AKNP), Chatthin Wildlife Sanctuary (CWS), Htamanthi Wildlife Sanctuary (HWS), and Shwe-U-Daung Wildlife Sanctuary (SUDWS) (Figure 1). These protected areas represent a continuum of human pressure from relatively low in HWS, which is surrounded by extensive amounts of intact forest, to high in SUDWS and CWS, which are surrounded by agricultural land and severely degraded forest. AKNP falls in the middle as it is surrounded by a mix of relatively intact buffer zone forests and agricultural fields. For descriptions of the protected area system in Myanmar, see Rao et al. (2002) and Aung (2007).

Data Collection

The data were collected in a survey of individuals 18 years and older living in the 115 villages within 5 km of the four protected area boundaries. Overall, 3,274 respondents were interviewed, including 1,167 in 41 villages at AKNP, 862 in 28 villages at CWS, 886 in 28 villages at HWS, and 359 in 18 villages at SUDWS. Data collection began in CWS in 2000 and finished with a final study in SUDWS in 2003.

Thirty households were randomly selected from each village using ledgers maintained by village chairmen. The mean village size was 114 households, with villages containing between 11 and 815 households. In villages with fewer than 30 households, all households were selected. To ensure representation of the perspectives of different residents, the sample was roughly stratified by age, gender, and household position. At the first house in a village the husband was interviewed, the wife at the second, the grandfather at the third, the grandmother at the fourth, the eldest child 18 years or older at the fifth, and the youngest child 18 years or older at the sixth. If the appropriate person was not available, the interviewer proceeded through the sequence until a respondent was identified. The response rate was over 99%. Interviews lasted about 15 minutes and were conducted to the extent possible without others present.

The first author trained three local schoolteachers to conduct the survey and they collected data at CWS and SUDWS. Two of these teachers trained other local schoolteachers to conduct the surveys at AKNP and HWS. In each area, at least half the interviewers were women. At the insistence of the wardens, one of three interviewers at HWS and four of eight interviewers in AKNP were staff. It is possible that including park staff as interviewers may have biased responses. A study in AKNP and HWS indicated that residents were more likely to openly air complaints if protected area staff were present in group meetings (Eberhardt 2003). However, we found no evidence of bias. There is not a statistically significant difference in attitude toward protected areas between respondents interviewed by park staff and those interviewed by teachers (results not shown). Further, the results presented remain identical when the interviewers' employment type is included as a variable in the models.

The survey instrument was a standardized and open-ended questionnaire. The first section of the questionnaire consisted of questions about socioeconomic characteristics, such as age and education. The second part consisted of questions about their perceptions and attitude toward the PAs. We define attitude as a psychological tendency expressed by evaluating a particular object with favor or disfavor (Ajzen 2001). In this case, we define it as like or dislike of a protected area. Attitudes consist of beliefs, which are associations people establish between the attitude object and various attributes (Ajzen 2001).

A list of beliefs, which we refer to as perceptions, was generated by asking people about the benefits and problems of the protected areas. Specifically, respondents were asked, "Does the area provide benefits?" and, if yes, "What are they?," and "Does the area cause any problems?" and, if yes, "What are they?" Next, in order to assess attitude, respondents were asked, "Do you like or dislike the area?"; this question was followed by "Why?" or "Why not?" to generate additional perceptions that the questions about benefits and problems may not have triggered.

Measures

The dependent variable is respondents' attitude toward the PA. This variable is coded with a one indicating that the respondent likes the area and thus has a positive attitude toward the protected area. Conversely, a zero indicates the respondent dislikes the area.

Perceptions are measured using dichotomous variables based on categories of benefits and problems. Perception categories were created by sorting people's

perceptions of benefits and problems and reasons for liking or disliking the areas
into major positive and negative categories. The categories were created inductively
after consideration of the verbatim responses gathered in the survey. Negative per-
ception categories that emerged include: (1) illegality of resource extraction; (2) con-
flicts with protected area management, such as cropland reclaimed by the protected
area and fines imposed for illegal entry and extraction; and (3) and crop damage by
wildlife. The positive perception categories include: (1) conservation benefits, includ-
ing protection of wildlife species, forest, and ecosystem services; (2) availability of
resources for extraction, such as fuelwood and housepoles; (3) protected area man-
agement activities, such as development and road building; and (4) country-level
benefits, such as natural heritage. These variables are coded one if the respondent
gave a response that fell within the respective category and a zero if the respondent
did not. For example, a respondent who said that the area allowed him or her to col-
lect fuelwood was given a one for extraction benefits. For a detailed description of
the perception categories, please see Allendorf et al. (2006).

Gender, the independent variable of interest, is a dichotomous variable with a
one indicating that the respondent is a woman and a zero indicating a man. Other
socioeconomic measures included in the analysis are age, education, and occupation.
Protected area is also included as a socioeconomic control; it is a categorical variable
denoting the protected area the respondent lives near. Age is divided into four cate-
gories: those under 30, 30–39, 40–49, and 50 years or older. Education is divided into
three categories: no schooling, 1–4 years of schooling, and 5 or more years of school-
ing. Occupation is a dummy variable with a one indicating the respondent is a farmer
and a zero indicating otherwise. Other occupations were too rare to employ a more
nuanced measure of occupation. Preliminary analyses also included landholding of
the household as a measure of household wealth. However, landholding was not sig-
nificantly associated with attitude, did not affect the results for gender, and was
highly correlated with occupation (results not shown). Thus, the results presented
here do not include landholding.

Analysis

The analysis takes three main steps. First, we examine the distribution by gender of
attitude toward the protected area and potential determinants of a positive attitude,
including perceptions of the protected area and socioeconomic characteristics. This
allows us to evaluate whether there are differences in attitudes, perceptions, and
socioeconomic characteristics between men and women.

Second, we use nested multivariate logistic regression models to examine
whether gender differences in the distribution of the socioeconomic characteristics
and perceptions explain any gendered difference in attitude. We begin with a bivari-
ate model with gender as the only variable in the model. This bivariate model pro-
vides a baseline of the gendered difference in attitude that does not control for
gendered differences in the distribution of any other characteristics or perceptions.
In a second model, we add socioeconomic characteristics to see how much of the
gendered difference in liking is explained by socioeconomic characteristics alone.
An odds ratio of one for the gender variable would indicate that there is no differ-
ence between women and men in liking the protected area when controlling for other
variables in the model. Thus, if the odds ratio for gender becomes closer to one when
other variables are added to the model, this indicates that differences in the

distribution of the other variables by gender account for part of the gender gap in attitude toward the protected area. In a third model, we add perceptions to the baseline bivariate model to see how much perceptions alone account for the gender gap in attitude. In a fourth model, we add both the socioeconomic characteristics and perception variables simultaneously to the model. Model 4 shows how much of the gender gap in attitude is explained together by socioeconomic characteristics and perceptions.

Finally, we perform a decomposition of model 4, which includes both the socioeconomic characteristics and perceptions. This decomposition provides a more precise estimate of the proportion of the gender gap in attitude that is explained by our model. It also provides an estimate of the contribution of each individual variable in explaining the gender gap. This allows us to pinpoint which variables are most important.

With a linear regression model, a Blinder–Oaxaca decomposition decomposes the differences in predicted values of the dependent variable into two parts (Blinder 1973; Oaxaca 1973). The first part indicates differences due to group differences in the distribution of the independent variables, often summarized as endowments. This first part can also be further decomposed into the contribution of each independent variable in the model. The second part indicates differences due to residual, or remaining, differences, including any differences due to variables missing from the model.

Our dependent variable is not continuous so we are not able to employ the standard Blinder–Oaxaca decomposition, which uses a linear model. Instead, we use a Blinder–Oaxaca decomposition adapted for nonlinear models (Fairlie 1999; Fairlie 2005). This nonlinear approach decomposes the gap in the predicted probabilities derived from the model, rather than predicted values of the dependent variable. The equation for this decomposition, $Y = F(X\hat{\beta})$, is:

$$\overline{Y}^M - \overline{Y}^F = \left[\sum_{i=1}^{N^M} \frac{F\left(X_i^M \hat{\beta}^M\right)}{N^M} - \sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^M\right)}{N^F} \right] + \left[\sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^F\right)}{N^F} - \sum_{i=1}^{N^F} \frac{F\left(X_i^F \hat{\beta}^M\right)}{N^F} \right]$$

where N^j is the sample size for gender j (Fairlie 2005). The first term estimates the contribution of differences in the distribution of independent variables by gender in the model, while the second term estimates the residual difference. This first term can again be further decomposed into the contribution of each independent variable in explaining the gap in predicted probabilities between women and men. The specification equation can vary to include men's coefficients, women's coefficients, or the coefficients of men and women pooled together as the weights for the first term. The results are sensitive to the choice of weighting. We ran all three specifications, which give similar results, but present only the results for the pooled specification. Estimating the contribution of each independent variable to the gap further requires matching the women's distribution of independent variables to the men's distribution (Fairlie 1999; Fairlie 2005). Following Fairlie, we do this by drawing 1,000 random subsamples of men equal in size to the smaller subsample of women. The mean value of these 1,000 estimates is used as an approximation of the results for the full subsample of men.

Results

Do Men's and Women's Attitudes, Perceptions, and Socioeconomic Characteristics Differ?

The majority of both men and women report that they like the protected area. However, men are significantly more likely to have a positive attitude (Table 1). Seventy percent of men like the area compared to 58% of women. Except for problems with wildlife, women are less likely to report all of the benefit and problem categories. The most substantial difference is in the perception of conservation and

Table 1. Descriptive statistics, including *p* values from chi-square tests of whether the distributions differ significantly between men and women

	All respondents ($n = 3{,}274$), %	Men ($n = 2{,}035$), %	Women ($n = 1{,}239$), %	*p* value from χ^2 test
Gender				
Men	62.2			
Women	37.8			
Age (years)				
<30	18.9	15.6	24.1	.00
30–39	24.2	23.4	25.4	
40–49	22.2	23.0	20.9	
50+	34.8	38.0	29.5	
Education				
None	11.1	5.9	19.6	.00
1–4 years	71.0	73.7	66.6	
5 + years	18.0	20.5	13.8	
Occupation				
Farmer	80.0	81.3	77.9	.02
Other	20.0	18.7	22.1	
Protected area				
AKNP	35.6	36.1	35.0	.00
CWS	26.3	23.5	30.9	
HWS	27.1	26.3	28.3	
SUDWS	11.0	14.1	5.8	
Problems of PA				
Extraction	37.3	40.5	32.0	.00
Management	15.2	16.7	12.8	.00
Wildlife	4.7	4.7	4.6	.88
Benefits of PA				
Conservation	53.5	61.6	40.3	.00
Extraction	10.4	12.2	7.4	.00
Management	7.2	8.5	5.3	.00
Country	11.6	13.3	8.7	.00
Attitude toward PA				
Likes	65.4	70.0	57.8	.00
Does not like	34.6	30.0	42.2	

ecosystem service benefits. The majority of men, 62%, perceive conservation and ecosystem benefits, while only 40% of women do.

The distributions of each of the socioeconomic characteristics also differ significantly by gender (Table 1). Women respondents are younger and have less education than men. For education, the majority of both men and women have primary schooling. Women, however, are more concentrated in the category of no education. While the vast majority of both men and women are farmers, women are slightly less likely to be farmers than men. The distribution of respondents by gender also differs significantly across the protected areas. Most notably, a larger proportion of men were interviewed in SUDWS because women were busy planting crops in the fields when interviewers visited homes to conduct interviews.

Do Differences in Socioeconomic Characteristics and Perceptions Account for the Gendered Difference in Attitude?

Next, we examine if gender differences in the distribution of the socioeconomic characteristics and perceptions explain the gender gap in liking the protected area using nested logistic regression models. In the preceding section, we found that the distributions of all of the socioeconomic characteristics and nearly every perception of the protected area differ significantly by gender. Thus, we examine whether these gendered differences in socioeconomic characteristics and perceptions account for the gender gap in attitude.

These logistic regression models are presented in Table 2. In model 1, the baseline model, gender has an odds ratio of 0.59, indicating that the odds of women liking a protected area are just over half that of men's odds. In model 2, when the socioeconomic characteristics are added to the model, the gender odds ratio increases to 0.65. This movement in the odds ratio toward 1 indicates that differences in the distribution of the socioeconomic variables do account for some of the gap between men and women. Specifically, the increase in the gender odds ratio from 0.59 in the bivariate model to 0.65 in the second model is largely due to gendered differences in the distribution of education and protected area of residence. The odds ratio of 2.03 for 5 or more years of schooling indicates that respondents with this level of education have twice the odds of liking the protected area compared to those with no schooling. As discussed earlier, women have less education than men. Thus, once we control for education, we explain some of the gender gap in attitude toward the protected area. Further, the women in this sample were more likely than men to live in CWS and HWS—the two protected areas with lower levels of liking. By contrast, occupation works in the opposite direction. Compared to men, a smaller proportion of women are farmers, yet the odds ratio of 0.66 indicates that farmers are less likely than those with other occupations to like protected areas. Thus, this result indicates that if women were farmers in the same proportion as men, there would be an even larger gender gap in attitude. Age does not have a significant effect on attitude. Thus, women's younger age does not help explain the gender gap in attitude.

In model 3, when the perception variables are added to the bivariate model (Table 2), the odds ratio for gender increases from 0.59 to 0.67, indicating that some, but not all, of the gender gap is explained by gendered differences in perceptions. In model 3, the odds ratios above 1 show that reporting benefits of the protected area

Table 2. Odds ratios from multivariate logistic regression models of liking the protected area ($n = 3,274$)

	Model 1: bivariate	Model 2: characteristics	Model 3: perceptions	Model 4: full
Respondent is a woman	0.59**	0.65**	0.67**	0.71**
Age (years)				
<30 (reference)		1.00		1.00
30–39		0.88		0.85
40–49		0.98		0.90
50+		1.09		1.09
Education				
None (reference)		1.00		1.00
1-4 years		1.01		1.21
5+ years		2.03**		1.52†
Occupation				
Farmer		0.66**		0.76†
Other (reference)		1.00		1.00
Protected area				
AKNP (reference)		1.00		1.00
CWS		0.27**		1.12
HWS		0.67**		2.24**
SUDWS		0.94		1.50*
Problems of PA				
Extraction			0.13**	0.12**
Management			0.15**	0.17**
Wildlife			0.19**	0.22**
Benefits of PA				
Conservation			27.91**	29.7**
Extraction			6.33**	7.26**
Management			8.90**	11.63**
Country			1.04	0.71†
Log likelihood	−2,086.4	−1,940.8	−1,113.7	−1,086.7
Model χ^2	50.5	341.8	1,995.8	2,050.0
AIC	4,176.8	3,903.5	2,245.4	2,209.3

Note. AIC, Akaike information criterion.
Significance: †$p < .10$, *$p < .05$, **$p < .01$.

substantially increases the odds of liking the area. For example, the odds ratio of 6.33 for extraction benefits indicates that a respondent who says extraction is a benefit has more than six times the odds of liking the park, compared to a respondent who did not mention extractions as a benefit. Similarly, reporting problems with the protected area decreases the odds of liking the park. For example, the odds ratio of 0.19 for wildlife problems suggests that a respondent who reports problems with wildlife has one-fifth the odds of liking the park compared to a respondent who did not report wildlife problems. Women are less likely than men to report benefits of the protected area. Thus, the results indicate that women's lower reporting of benefits in comparison to men accounts for part, but not all, of the gap in attitude toward

the protected areas between women and men. However, as noted earlier, women are also less likely to report problems. Thus, like occupation, the perceptions of problems are acting to reduce the gender gap in attitude, but this effect is overwhelmed by benefits and other factors that are not accounted for in the model that work to increase the gender gap.

In model 4, both socioeconomic characteristics and perceptions of the protected area are added to the model (Table 2). In this model, the gender odds ratio rises to 0.71, indicating that characteristics and perceptions together explain more of the gender gap in attitude than either of the two alone. However, the odds ratio of 0.71 is still significant and below 1, indicating that part of the gender gap in attitude remains unexplained. Model 4 also indicates that much of the effects of the socioeconomic characteristics are mediated by perceptions. When perceptions are added to the model, the effects of education and occupation are diminished with the odds ratios moving closer to 1. Specifically, the odds ratio for 5 or more years of education declines from 2.03 to 1.52 and the odds ratio for occupation increases from 0.66 to 0.76.

Which Socioeconomic Characteristics and Perceptions Are Most Influential in Explaining the Gendered Difference in Attitude?

The results of the decomposition of model 4 appear in Table 3. The predicted probability from model 4 of men liking a protected area is 0.700, while the predicted probability for women is 0.578. Thus, the difference in the predicted

Table 3. Decomposition of the difference between men's and women's probabilities of liking the protected area

	Percentage points	Percent explained	*p* value
Difference (M – W)	12.24	100.0	
Explained	8.01	65.4	
Unexplained	4.23	34.6	
Detailed contributions:			
Age	0.10	0.8	.32
Education	0.50	4.1	.13
Occupation	−0.01	−0.1	.37
Protected area	0.46	3.8	.04
Problems of PA			
Extraction	−3.07	−25.1	.00
Management	−0.96	−7.8	.00
Wildlife	−0.08	−0.7	.22
Benefits of PA			
Conservation	10.04	82.0	.00
Extraction	0.83	6.8	.00
Management	0.41	3.3	.00
Country	−0.25	−2.0	.08
Characteristics	1.05	8.6	
Perceptions	6.93	56.6	

probability of men's liking the protected area versus women's liking is 12.24 percentage points (Table 3). Model 4 accounts for 8.01 of these points or 65.4% of this difference. Thus, one-third of the gender gap in attitude remains unexplained by our model.

The decomposition further shows that perceptions explain the majority of the gender gap, while socioeconomic characteristics explain only a small portion of the gap. Perceptions explain 6.93 points or 56.6% of the gender gap in attitude, while socioeconomic characteristics explain 1.05 points or 8.6% of the gap (Table 3). In keeping with the small overall contribution of socioeconomic characteristics, the individual contributions of socioeconomic characteristics are also small. Age, education, and occupation account for 0.1, 0.5, and −0.01 percentage points of the gap, respectively. Further, none of these individual contributions to explaining the gap differs significantly from zero. The only socioeconomic characteristic that has a significant individual contribution is the protected area the respondent lives near, which explains 0.46 percentage points or 3.8% of the gender gap in attitude.

Most of the contribution of perceptions in explaining the gender gap is due to only one perception, namely, conservation benefits. Conservation benefits account for 10.04 percentage points or 82% of the gap. The next largest contribution is −3.07 points from problems with extraction. A negative value indicates that gender differences in the distribution of extraction work to decrease, rather than increase, the gap between women and men. As noted earlier, this is because women are less likely to report extraction problems and, in turn, extraction problems decrease the probability of liking a protected area. Thus, if women reported extraction problems in the same proportion as men the attitude gap would be even larger. The other perception categories account for less than 1 point or 8% of the gender gap in attitude. Further, the individual contributions of wildlife problems and benefits to the country are not only small, but also not statistically significant.

Discussion and Conclusion

We find that men are more likely than women to have a positive attitude toward these protected areas in Myanmar. The differences in perceptions of the benefits and problems of the protected areas explain a significantly greater part of the gender gap in attitudes than socioeconomic characteristics, with a perception of conservation benefits playing the most significant role.

The significant role that conservation benefits play in attitude indicates the importance of people understanding the noneconomic benefits that protected areas can provide and suggests that increasing women's awareness of these benefits may improve their attitude. Other studies have also found that a lack of knowledge has important implications for women's attitudes and values toward the environment. Moorman (2006) found in La Selva Biological station, Costa Rica, that greater knowledge of local ecology and conservation increased the likelihood that residents valued the PA, and that women, although they visited the protected area as often as men, had less knowledge about ecology and conservation. She suggests women's foundation of knowledge is lower to begin with, and because education programs do not recognize this difference, the programs are unable to bring the women to the same level as men. Xu et al. (2006) found that men had more positive attitudes toward Wolong Biosphere Reserve in China and that this was positively correlated with their level of knowledge about the reserve. They attribute this difference to the

way knowledge is spread in a top-down fashion through formal institutions that target male head of households.

These results suggest that protected area management may require special efforts to make information about protected areas accessible to women, such as making special efforts to include them in activities, or, if necessary, targeting activities specifically at women. A follow-up study we did in four years after the original study supports the idea that increasing women's knowledge about protected areas may improve their attitudes. In CWS, we repeated the attitude survey after environmental awareness activities had been initiated within the communities (Allendorf 2012). After the activities were conducted, the percentage of women who perceived conservation benefits increased from 34% to 50%, while the percentage of men only increased from 38% to 44%, and women's attitudes also improved (unpublished data). In this case, women were receptive to learning about benefits of conservation when information was available. Thus, women's attitudes toward the protected areas may be improved through relatively simple interventions.

While perceptions and socioeconomic characteristics measured here explain most of the gap in attitude, about one-third remains unexplained. Thus, there are other factors that we did not examine that account for some of the difference between men's and women's attitudes. Similar to women's lack of awareness of conservation benefits, they may also have less access to other types of information, such as the history, the reasons for creation, and the national or global importance of the protected area (Hill 1998), which may influence their attitude (Xu et al. 2006). It is possible that having access to more information about the protected area may influence men to be more positive.

Another possible explanation for the unexplained portion of the gap is gendered differences in dependencies on resources from the area. In some places, such as South Asia, women are often the primary users of forested areas (Badola 1998; Faasen and Watts 2007) and are more affected by regulations against extraction. However, not much is known about people's livelihoods and the relationship with the environment in Myanmar in general, and even less is known about differences by gender. The first author's personal observations and discussions with colleagues in Myanmar suggest that men are primarily responsible for collecting fuelwood, while men and women collect nontimber forest products, although this varies from area to area. A better understanding of these differences may help explain the gap. It is also possible that there are gendered differences in the ways men and women experience the enforcement of regulations against extraction. For example, in Rajaji National Park in India, Ogra (2008) found that women fear harassment or even sexual assault from guards if they are caught illegally extracting (Ogra 2008). It is possible that Myanmar women also fear negative interactions with guards in similar ways.

The finding that men are more likely than women to express their perceptions mirrors other studies that have found that women tend to express their opinion less frequently (Arjunan et al. 2006) or downplay what they know (Gururani 2002). One reason women may report fewer problems and benefits is that gendered norms may encourage men to speak more and women to speak less. Ostwald and Baral (2000) found that men and women differed in their perceptions of local forestry management in Orissa, India, in ways that are similar to this study: Men raised more issues and raised more abstract issues. They attribute the difference to the fact that women lacked confidence and were passively involved in management, primarily receiving information about forest management from male family members. This pattern

has also been found in studies on gender differences in political knowledge and opinions, which found that women are more likely to say they do not know in surveys (Rapoport 1981; Mondak and Anderson 2004). Rapoport (1982) hypothesizes that either a respondent lacks the information or education to construct responses or lacks confidence required to develop and express opinions. He attributes the gap to differential socialization between men and women, as the gap exists even after controlling for objective competence in the area of political knowledge. It is possible that the same processes are at play in this study. It may be that women know less than men about the protected areas, but, in addition, women may also be socialized to lack the confidence to develop and express their knowledge to an interviewer.

The one exception to the pattern that women are less likely to mention each perception category is that women and men are equally likely to mention conflicts with wildlife. Other studies have also found perceptions of wildlife problems are an issue of equal importance to men and women (Gillingham and Lee 1999; Ogra and Badola 2008). Women may mention this issue as often as men because it is a concrete problem in their daily lives. However, if this were the full explanation, then we might expect women to mention as frequently as men extraction problems and benefits, which are also concrete issues in their everyday lives. A possible explanation may be that women feel more comfortable expressing issues concerning wildlife, which are not related to their own behavior in the same way that extraction and management problems might be. For example, statements related to extraction or management may reveal potentially sensitive information about their own behavior, such as illegal extraction from the area. They may be more sensitive to talking about these issues because they may personally participate in these activities more frequently than men. They may also be more worried about the repercussions of being caught because as women they may be more vulnerable in their interactions with people of authority, such as protected area staff.

The difference in men's and women's responses to the survey suggest that when trying to understand local residents' relationship with protected areas, special care should be taken to ensure women's engagement. In surveys, for example, additional probing that reassures women that their opinion is valued may help to address an imbalance in responses between men and women. Because women internalize expectations from society about themselves and others confirm these expectations with their behavior toward women (Diekman and Schneider 2010), interviewer expectations can work to increase or decrease women's engagement. Managers and researchers may be too quick to accept women's declarations that they do not know or have fewer ideas because that meets their expectations of women, whom they perceive as having less education and less access to information. This study showed a difference in responses to a survey, but reactions may also differ to other types of activities, such as public meetings, committees, focus groups, or other methods used to engage local communities (Anthony et al. 2004).

Women are an important constituency for conservation of protected areas. While little is known about gendered relationships with protected areas in Myanmar or elsewhere, this study highlights the need to explicitly recognize and analyze gender differences in park–people relationships, particularly in terms of access to information and the ways through which women are engaged in conservation. Understanding the role that gender plays in local communities' relationships with protected areas can help address the gender disparity in biodiversity conservation policy and actions, and ensure that conservation is fair, inclusive, and more effective.

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